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Return to Duty and Deployment After Major Joint Arthroplasty

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ABSTRACT

With an increasing incidence, individuals are undergoing total joint arthroplasty at a younger age. This study evaluated the likelihood of return to duty and deployment to the combat zone after major joint arthroplasty and their relationship to functional outcome. Retrospectively, service members having undergone major joint arthroplasty completed the Short Musculoskeletal Function Assessment and a deployment specific questionnaire; 93.3% (n = 42/45) follow-up was achieved with the average time from surgery being 4 1/2 years. Eighty-six percent of patients returned to duty. Of those, at least 70% were able to deploy to the combat zone and all were able to complete a full tour as assigned. No statistical significance was seen between those that deployed and those that did not in both the bothersome index and functional assessment scores. Total joint arthroplasty presents an effective intervention when appropriately indicated in a young active population seeking the ability to continue a military career.

With increasing incidence, individuals are undergoing total joint arthroplasty at a younger age. Trends in the use of total joint arthroplasty demonstrate that there has been a three-fold increase in total hip arthroplasty (THA) and a seven-fold increase in total knee arthroplasty (TKA) within the past 40 years [1]. More importantly perhaps is that the incidence over the past decade has been increasing at a much greater rate. Those that fell under age forty-nine showed increased frequency of total joint arthroplasty with a two-fold increase from 2005–2008 alone [1].

Traditionally, total joint arthroplasty (TJA) in younger patients has presented multiple clinical challenges and resulted in inferior outcomes [2–4]. Continued advancements in engineering, biomaterials, and surgical techniques has led to improved outcomes in the younger patient demographic. Current trends reveal expanding indications in a more active population [5–7]. Multiple studies have illustrated that a higher level of physical activity places individuals at greater risk for developing osteoarthritis (OA) [8–10]. Military service members in particular are subject to increased physical demands and compared to age matched groups within the general population have shown not only significantly higher rates of OA, but also an overall younger demographic of patients manifesting OA [11]. The most common diagnosis among service members undergoing a Medical Evaluation Board (MEB), the military disability system equivalent, is OA.

After a hip or knee arthroplasty, patients are advised to make certain activity modifications that may include refraining from running, jumping, or other impact activities [2,5,12,13]. Military guidelines on joint arthroplasty are clear in that it is a cause for rejection for appointment, enlistment, or induction. This means that individuals who have already had a joint arthroplasty are not permitted to join the Military. However, once in the military, service members are retainable [14]. Retention on active duty following a total hip arthroplasty has been shown to be 67% (18 of 27 patients), and retention after a total knee arthroplasty, 100% (5 of 5 patients).[6] Despite being a very small cohort a relatively high percentage of service members who undergo TJA remain on active duty and therefore we feel that further defining the rate of deployment and specific limitations encountered during tours to the combat zone is of great importance.

The purpose of this study is to evaluate the likelihood of return to duty and deployment after major joint arthroplasty and their relationship to functional outcome.

Methods

This study was designed as a retrospective chart/database review with telephone functional assessment questionnaire. Utilizing the surgical scheduling system (S3) forty-five active duty military personnel who underwent knee or hip arthroplasty by our senior author (blinded manuscript) between March 2005 and June 2008 at Brooke Army medical Center (BAMC) were identified. These dates were chosen to ensure a minimum of three-year follow-up. We excluded all retirees and dependents.

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Those enrolled were contacted via telephone and informed consent was obtained. An independent outcomes assessor without prior knowledge of the patient performed all interviews and collected all data. Those that met the study criteria provided demographic information (age at time of surgery, gender, rank, military occupation, and surgical history) completed the short musculoskeletal functional assessment (SMFA), and when applicable an 11-point deployment related questionnaire developed for the purpose of this study. The SMFA was chosen based upon its validated ability to clinically asses an individuals health status with regard to function based upon the musculoskeletal system [15–19]. The SMFA consisted of a thirty-four-item questionnaire to evaluate patient function (Function Index), and a twelve-point assessment of the how bothered the subject felt with functional problems (Bothersome Index).

Statistics

The data were analyzed using the Statistical Package for Social Sciences (SPSS) Windows and Microsoft Excel. Descriptive statistical analysis included mean, median and standard deviations. A comparison was done between groups. Groups were defined by those who deployed and those that did not. Continuous variables were compared via *t* test for parametric data. All tests for significance were 2-tailed, with level of $\alpha = 0.05$.

Results

General Demographics

This study achieved a 93.3% follow-up (42/45) with a minimum follow-up time of 3 years and an average of 4 1/2 years (3–6 1/2 years). Of the forty-five identified subjects, one patient was currently deployed to Afghanistan and the remaining two were unavailable for follow-up as they were unable to be contacted. All total 42/45 (93.3%) of those eligible for participation were included and enrolled in the study (Fig. 1). Of the 42 enrolled subjects 48% (n = 20) underwent total knee arthroplasty, 48% (n = 20) underwent total hip arthroplasty, and 4% (n = 2) underwent unicompartmental knee arthroplasty. Three of the twenty (15%) subjects in the total knee arthroplasty group had undergone staged bilateral knee arthroplasties and six of the twenty (30%) total hip arthroplasty subjects underwent staged bilateral hip arthroplasties. The average age of all subjects was 45 (19–60). The average age in the deployed group was 43 and in the non-deployed group 47, however, this was not statistically significant ($P = 0.13$).

Military Demographics

Eighty-six percent either remained on active duty at the time of follow-up or remained on active duty through full military retirement. The remaining 14% (n = 6) completed a MEB following their total joint arthroplasty with two patients undergoing an MEB secondary to arthroplasty. A large portion (n = 21) of service members met criteria for retirement and completed a retirement board within 18 months of their surgery. Of those who remained on active duty at least 18 months from surgery, 70% (n = 16) deployed to the combat zone. The average number of months following surgery until deployment was 20.9 (6.0–47.6). Fifty-six percent (n = 9) of those who had deployed were still serving on active duty at time of contact at an average follow-up of 4 1/2 years from surgery. Forty-four percent (n = 7) of those that did not deploy remained on active duty status at time of contact.

Senior enlisted (E-7 and above) comprised 40% (n = 17) of the population studied with officers (O-4/CW-4 or above) making up 31% (n = 13) and junior enlisted making up 29% (n = 12). Of those that deployed 42% were junior enlisted, 33% were officers, and 25% were senior enlisted (Fig. 2).

Functional Assessment Outcomes

When evaluating the SMFA, no significance was seen between the functional index of those who did and those who did not deploy ($P = 0.088$), nor did the Bothersome index demonstrate significance between the groups ($P = 0.067$). Both the Functional index and Bothersome index did trend to favor improved scores in those able to deploy. Looking at the individual embedded components of the SMFA revealed that the only significant subcategory was that of arm and hand function ($P = 0.01$) between those that deployed and those that did not (Fig. 3).

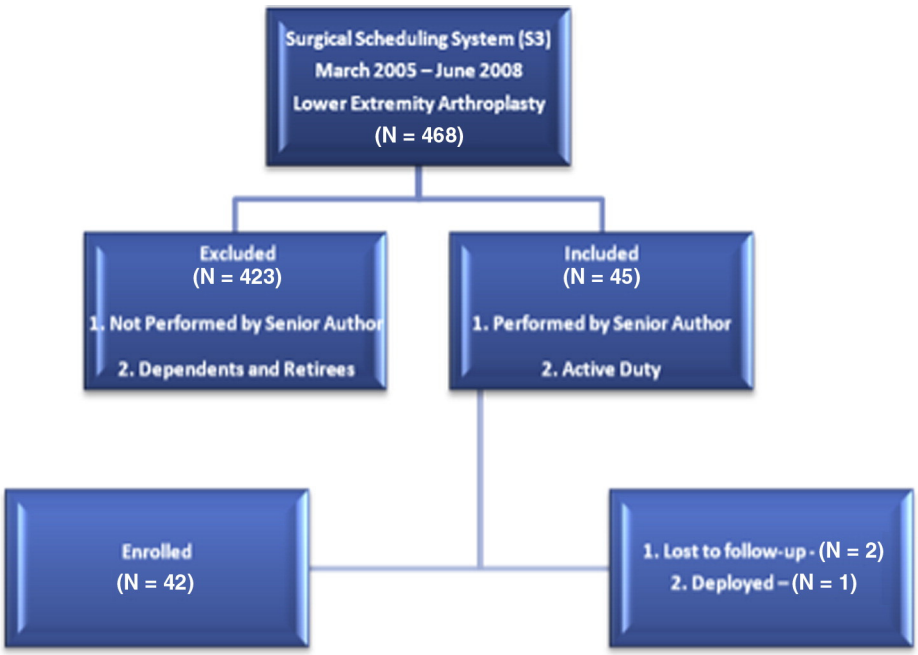

Fig. 1. Participant inclusion/exclusion algorithm.

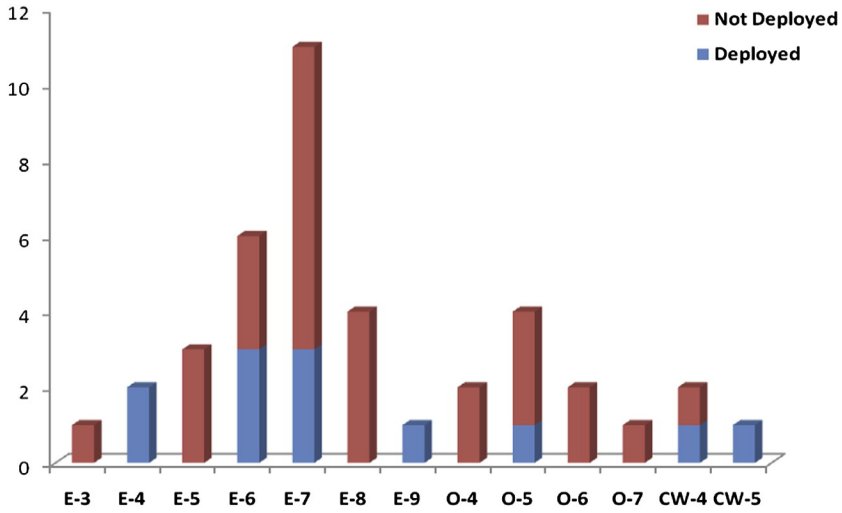

Fig. 2. Number of those that deployed and those did not as stratified by military rank.

When comparing those who underwent an MEB retirement versus the rest of the enrolled patients, the MEB group demonstrated significantly worse functional scoring ($P = 0.03$) as well as a significantly higher bothersome index ($P = 0.017$). Of those who remained on active duty at the time of follow-up there was no statistical significance in functional scoring between those who deployed and those who had not deployed ($P = 0.34$).

Deployment Outcomes

All of those who deployed felt they were able to perform their duties at least most of the time with forty-two percent being able to perform their duties all of the time. Among the deployed group, 100% reported no difficulty in firing and carrying their individually assigned weapon. Completing 3–5 second rushes (short sprints and quick evasive maneuvers on foot) proved to be the most difficult task with 86% reporting at least slight difficulty. Riding in a military vehicle presented difficulty in 50% of those deployed. Riding in a military aircraft was reported as slightly difficult in 58% of those deployed (Fig. 4).

Discussion

In the current military climate, it is crucial to maximize the deployable force strength. To date, our study represents the largest completed within our military population. In this study we were able to demonstrate that those service members who underwent a total joint arthroplasty and remained on active duty at least 2 years following surgery had a 70% deployment rate. The retention on active duty in this study echoed previously cited literature by Kuklo et al. in THA patients; however, their findings of 100% retention to active duty in a very small cohort of total knee arthroplasty patients (n = 5) were not demonstrated within this study [6]. Those patients looking to remain on active duty status following total joint arthroplasty and potentially deploy may be counseled that they will have an 86% chance of remaining on active duty. Civilian data has shown an expected return to work rate of 90.4% in those averaging 49.5 years of age following THA which closely approximates our finding of 86% retention in a slightly younger (45 years of age) population [7]. Military service members on active duty are required to maintain a baseline level of physical fitness and complete regular physical activity level evaluations. This group may represent a higher functional activity and demand than civilian counterparts or more closely match civilians who return to athletic activity.

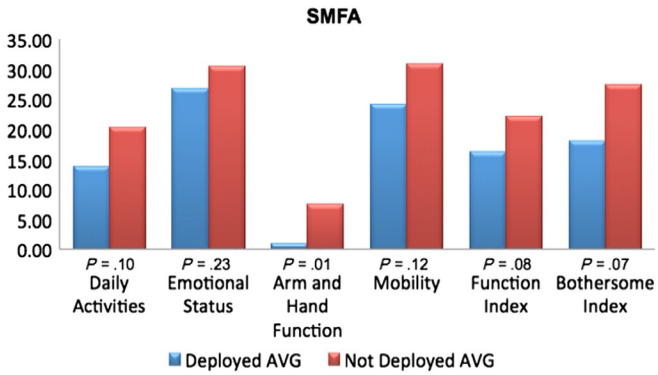

Fig. 3. Individual components of the SMFA compared by group.

The joint replacement did not pose a medical problem or prevent satisfactory completion of duties during deployment in the combat zone. Of those deployed all felt that they were able to fulfill their duties at least most of the time. This information is crucial and highlights that undergoing a total joint arthroplasty should not preclude service member from deploying to the combat zone. Of all the challenges faced in a deployed environment 3–5 second rushes (short sprints) proved most difficult. This finding is not unexpected given the difficulty many young civilian patients having undergone TJA find athletic activities requiring short sprints (racquetball, singles tennis, impact aerobics, baseball) [13,20]. Mont et al. reported on competitive tennis players following TJA experiencing marked pain improvement but a reduction in court speed analogous to our service members' experience with 3–5 second rushes [21]. Additional difficulties with military transportation were noted. Military vehicles with high floor panels were sighted by patients as requiring a high degree of knee and hip flexion that at times presented difficulties (Fig. 5). Similar seating positions may be found in various sports cars or specialty vehicles in the civilian sector. Aircraft was noted by multiple subjects having undergone total hip arthroplasty as causing posterior thigh and buttock pain over their previous surgical incision. It should be noted that all patients who underwent total hip arthroplasty in our study had a posterior surgical approach. This finding may indicate the need to utilize alternative surgical approaches in total hip arthroplasty other than a posterior approach in those individuals likely to be subject to such seating more frequently (aviation, air force, etc).

Interestingly there was no statistical significance between the group that deployed and the group that did not deploy in both the Bothersome index and functional assessment scores overall; however,

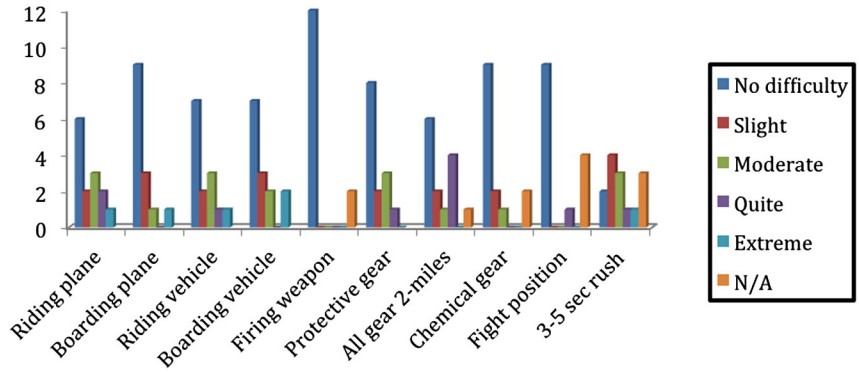

Fig. 4. Ability to perform various deployment related activities in a combat zone.

statistical significance was reached amongst the arm and hand functional evaluation. Those not deploying had significantly worse hand and arm function compared to those who deployed, which may be indicative of the underlying global degree of arthritis present in those not able to deploy. Responses regarding the ability to perform personal hygiene and to go out by themselves were found to be significant between those who deployed and those who did not. Although we did not specifically examine the role of self-efficacy, we propose that the differences seen between the groups in response to these questions may be attributed to differences in self-efficacy. Higher self-efficacy has been linked with improved functional ability in the immediate postoperative period in TJA as measured by a patient's abilities to perform certain tasks with physical therapy [22]. Additionally, pre-operative self-efficacy is reported to be a predictor of long-term post-operative outcome [23]. Future research in this field should attempt to obtain standardized self-efficacy scoring on patients and determine the role if any this may have in the military population following a total joint arthroplasty.

The weaknesses of our study are those inherent to any retrospective cohort study which rely on existing records and subject recall. This form of data collection is often less complete and accurate than data collected in a prospective study. In addition there is a tendency for response bias. To combat response bias our questionnaire was administered by an independent outcomes assessor unaffiliated with the clinical care of these subjects. Strengths may be viewed as the length of time for follow-up, a greater than 93% follow-up, and the use of a validated functional outcome assessment tool (SMFA) [15–19].

Fig. 5. Seated position in standard military ground transportation.

Conclusions

Eighty-six percent of patients return to duty following total joint arthroplasty. Of those, at least 70% were able to deploy to the combat zone all were able to complete a full tour as assigned. Total joint arthroplasty presents an effective intervention when appropriately indicated in a young active population seeking the ability to continue a military career.

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